What is claimed is:

1. A fiber laser comprising in a resonator:

a normal dispersion optical fiber;

an anomalous dispersion optical fiber;

a rare earth-doped optical fiber as a gain medium; and

a mode locking mechanism,

wherein at least said rare earth-doped optical fiber is included as said normal dispersion optical fiber, and a length of said rare earth-doped optical fiber is set shorter than that of said anomalous dispersion optical fiber.

2. A fiber laser comprising in a resonator:

a normal dispersion optical fiber;

an anomalous dispersion optical fiber;

a rare earth-doped optical fiber as a gain medium; and

a mode locking mechanism,

wherein at least said rare earth-doped optical fiber is included as said normal dispersion optical fiber, an absolute value of the normal dispersion per unit length at central wavelength of the output light spectrum in said rare earth-doped fiber is larger than that of the anomalous dispersion per unit length of said anomalous dispersion optical fiber.

3. A fiber laser comprising in a resonator:

a normal dispersion optical fiber, an anomalous dispersion optical fiber, a rare earth-doped optical fiber as a gain medium; and

a mode locking mechanism,

wherein at least said rare earth-doped optical fiber is

included as said normal dispersion optical fiber, a nonlinear coefficient ($\gamma 2L2)/(\gamma 1L1$) is larger than 1 where, in said rare earth-doped fiber, a nonlinear coefficient is $\gamma 1$[1/W/m], a length is L1[m], an effective nonlinear coefficient of other components of the resonator including the anomalous dispersion fiber is $\gamma 2$[1/W/m], a length is L2[m].

4. A fiber laser according to any one of claims 1, 2, 3, wherein a total dispersion of the central wavelength of the output light spectrum in said resonator is a value within a range of $-1ps^2$ to $+0.2ps^2$.

5. A fiber laser according to claim 4, wherein a core portion of said rare earth-doped optical fiber is added at least with an erbium(Er) ion.

6. A fiber laser according to claim 5, wherein a peak value of absorption coefficient in 1.53μm band of said Er-doped optical fiber is set within a range of 10dB/m to 35dB/m.

7. A fiber laser according to claim 6, wherein a dispersion value in 1.55μm band of said rare earth-doped optical fiber in said resonator is not less than $21ps^2/Km$.

8. A fiber laser according to claim 7, wherein a ratio of an absorption peak value to a dispersion value $\alpha/D[dB/ps^2]$ is not less than 500, where a dispersion value in 1.55μm band of said rare earth-doped optical fiber is $D[ps^2/m]$ and an absorption peak value in 1.53μm band is α[dB/m].

9. A fiber laser according to claim 8, wherein said resonator comprises a pump light source for injecting a pump light into said resonator and an optical multiplexer for multiplexing the pump light from said pump light source, and said resonator further comprises a rare earth-doped optical fiber, a single mode optical fiber, a polarization beam splitter, an optical isolator, and a polarization plate.

10. A broadband light source using fiber laser described in claim 9, wherein at least highly nonlinear fiber is connected with an output side of the fiber laser to generate a supercontinuum (SC) light.

11. A broadband light pulse generating device comprising:

a pulse light source generating a noiselike pulse in which an envelop curve of an intensive waveform is in a timewise pulse state; and

a nonlinear medium exciting a nonlinear effect to said noiselike pulse,

wherein said noiselike pulse generates the supercontinuum light in said nonlinear medium to generate a broadband pulse light.

12. A broadband light pulse generating device according to claim 11, wherein said pulse light source has a laser resonating structure comprising in the resonator a normal dispersion medium, an anomalous dispersion medium, a gain medium, and a mode-locking mechanism.

13. A broadband light pulse generating device according to claim 12, wherein said normal dispersion medium is made of an optical fiber having a normal dispersion, said anomalous dispersion medium is made of an optical fiber having anomalous dispersion, and said gain medium is made of a rare earth-doped optical fiber.

14. A broadband light pulse generating device according to claim 11, wherein said pulse light source comprises a noise light source generating noise light in which an intensive envelop curve is timewise constant, and a modulator modulating said noise light.

15. A broadband light pulse generating device according to claim 11, wherein said nonlinear medium is made of a DSF (dispersion shifted fiber), a dispersion flat fiber, and a photonic crystal fiber or a HNL (highly nonlinear fiber).

16. A noiselike pulse generating device generating a noiselike pulse in which an envelop curve of an intensive waveform is timewise pulse state by a duration-limited burst noise light, wherein the noiselike pulse generating device comprises a noise light source generating a noise light in which the intensive envelop curve is timewise constant and a modulator modulating said noise light, said modulator modulating said noise light to generate said noiselike pulse.